

Amendments

In the Claims

sub C1
A1
1. (Amended) An apparatus for guiding the movement of a surgical tool in relation to the anatomy of a patient, the apparatus comprising:

means for indicating to a human the difference between the actual and desired positions of the tool; and

means for determining an actual position of the means for indicating.

A2
7. (Amended) The apparatus of claim 1 wherein the means for indicating comprises at least one indicator [and further comprising means for determining the orientation of the at least one indicator in relation to the patient].

A3
12. (Amended) The apparatus of claim 1 wherein the actual and [a] desired positions are at least one of a desired location, trajectory, depth and rotation.

A4
17. (Amended) An apparatus [for guiding the movement of a surgical tool in relation to the anatomy of a patient, the apparatus] comprising:

a surgical tool having a tool reference frame:

at least one position indicator mounted to the tool, the at least one indicator [indicating] providing to a human operator an indication of the direction in which the tool should be moved to reach a desired position.

Please cancel claim 18 without prejudice or disclaimer.

A5
20. (Amended) The apparatus of claim 19 further comprising means for determining the relative orientations of the at least one indicator and the anatomy of [the] a patient.

sub C5
A6
25. (Amended) A surgical tool comprising:

a plurality of infrared emitters mounted to the tool; and

at least one human readable position indicator mounted to the tool.

Ab 26. (Amended) A method for guiding the movement of a surgical tool with respect to the anatomy of a patient having a patient reference frame, the method comprising the steps of:

determining a desired position of the tool based on an image of the anatomy of a patient, the image having an image reference frame;

[correlating the image and patient reference frames;

determining the actual position of the tool;]

determining a direction the tool must be moved to reach the desired position;

determining an actual position of a position indicator having an indicator reference frame;

and

[indicating] utilizing the position indicator to indicate to a human the direction in which the tool must be moved to reach the desired position, said indication being provided in relation to the indicator reference frame.

27. (Amended) The apparatus of claim 26 wherein the [tool is characterized by a tool reference frame and wherein the direction is indicated in relation to the tool reference frame] the position indicator is mounted to the tool and the step of determining an actual position of the position indicator includes determining an actual position of the tool.

C 28. (Amended) The method of claim 26²⁷ [wherein the direction is indicated in using at least one indicator and] further comprising the steps of:

determining the relative orientations of the [at least one] position indicator and the patient; and

compensating for changes in the relative orientation.

30. (Amended) The method of claim 26 wherein the position indicator is mounted to the tool and the position indicator comprises at least one indicator for indicating a direction in which the tool must be moved to reach a desired location and at least one indicator for indicating a direction in which the tool must be moved to reach a desired orientation.

31. (Amended) The method of claim 26 wherein the [direction is indicated by] position indicator includes a plurality of light emitting diodes mounted to the tool.

Please cancel claim 32 without prejudice or disclaimer.

Remarks

Claim 1 stands rejected under 35 U.S.C. § 112, first paragraph, as being a single means claim. Claims 1-35 stand rejected under the judicially created doctrine of double patenting over claims 6, 12, and 22 of U.S. Patent No. 5,517,990 to Kalfas ("Kalfas"). Claims 1-35 also stand rejected under 35 U.S.C. § 102(e) and 102(f) in view of Kalfas.

Kalfas

Kalfas discloses an image guided surgery apparatus and system which is used to guide the surgeon to a point in the anatomy of a patient utilizing images (e.g., MR or CT images) of the anatomy of the patient. A surgical tool includes a plurality of signal emitters 48, 50 which emit signals (e.g., ultrasonic, infrared, or the like) which are detectable by receivers 14. In a sonic embodiment described in detail in Kalfas, the travel time of the sound waves from each of the emitters 48, 50 to the receivers 14 is measured. Based on this information, the position of the tool with respect to the receivers is determined.

The spatial relationships between the tool, the image data, and the patient are registered or correlated by placing the tool at three or more fiducial marks or other locations on the anatomy of the patient. The points are correlated with corresponding points in the image. A representation of the tool is then displayed in human readable form on a monitor with its position superimposed on the image. This information is used to move the tool in a desired fashion with